

What is Claimed is:

1. A method for manufacturing tantalum carbide, comprising the steps of: placing tantalum or a tantalum alloy in a vacuum heat treatment furnace; heat-treating the tantalum or tantalum alloy under a condition where a native

5 oxide layer of Ta_2O_5 formed on a surface of the tantalum or tantalum alloy is sublimated to remove the Ta_2O_5 ; and heat-treating the tantalum or tantalum alloy by introducing a carbon source into the vacuum heat treatment furnace to form the tantalum carbide from the surface of the tantalum or tantalum alloy.

2. The method for manufacturing the tantalum carbide according to claim

10 1, wherein

the tantalum carbide is TaC formed by penetration of carbon into all areas of the tantalum or tantalum alloy.

3. The method for manufacturing the tantalum carbide according to claim

1, wherein

15 the tantalum carbide is formed by penetration of carbon into some areas of the tantalum or tantalum alloy, and the tantalum carbide has a laminated structure where Ta_2C and TaC are laminated in this order on the surface of the tantalum or tantalum alloy.

4. The method for manufacturing the tantalum carbide according to claim

20 1, wherein

the method is a heat treatment method for measuring change of an emissivity when the native oxide layer is removed using a pyrometer.

5. The method for manufacturing the tantalum carbide according to claim

1, wherein

a thickness of the tantalum carbide capable of being formed is controlled by adjusting temperature, time and pressure conditions for introducing the carbon source into the vacuum heat treatment furnace and
5 heat-treating the tantalum or tantalum alloy processed into an optional shape.

6. The method for manufacturing the tantalum carbide according to claim
1, wherein

the heat treatment condition under a condition where the native oxide layer of Ta_2O_5 is sublimated is at a temperature in a range from approximately
10 $1750^{\circ}C$ to $2000^{\circ}C$ and a pressure of approximately 1Pa or lower.

7. The method for manufacturing the tantalum carbide according to claim
1, wherein

the heat treatment condition for introducing the carbon source into the vacuum heat treatment furnace to form the tantalum carbide on the surface of
15 the tantalum or tantalum alloy is a temperature from $1860^{\circ}C$ to $2500^{\circ}C$, and a pressure of 1Pa or lower.

8. Tantalum carbide obtained by placing tantalum or a tantalum alloy in a vacuum heat treatment furnace; heat-treating the tantalum or tantalum alloy under a condition where a native oxide layer of Ta_2O_5 formed on a surface of
20 the tantalum or tantalum alloy is sublimated to remove the Ta_2O_5 ; heat-treating the tantalum or tantalum alloy by introducing a carbon source into the vacuum heat treatment furnace to make carbide penetrate from the surface of the tantalum or tantalum alloy.

9. The tantalum carbide according to claim 8, wherein
the tantalum carbide is TaC formed by the penetration of carbon into all areas of the tantalum or tantalum alloy.
10. The tantalum carbide according to claim 8, wherein
5 the tantalum carbide is formed by the penetration of carbon into some areas of the tantalum or tantalum alloy, and the tantalum carbide has a laminated structure where Ta_2C and TaC are laminated in this order on the surface of the tantalum or tantalum alloy.
11. A wiring of tantalum carbide formed by patterning tantalum or a
10 tantalum alloy into a prescribed shape on a semiconductor substrate, heat-treating the tantalum or tantalum alloy under a condition where a native oxide layer of Ta_2O_5 formed on a surface of the patterned tantalum or patterned tantalum alloy is sublimated, removing the Ta_2O_5 from the surface of the patterned tantalum or patterned tantalum alloy, heat-treating the tantalum
15 or tantalum alloy by introducing a carbon source, and penetrating carbon from the surface of the patterned tantalum or patterned tantalum alloy.
12. The wiring of the tantalum carbide according to claim 11, wherein
the wiring of the tantalum carbide is TaC formed by the penetration of carbon into all areas of the patterned tantalum or patterned tantalum alloy.
- 20 13. An electrode of tantalum carbide having a prescribed shape formed by processing tantalum or a tantalum alloy into a prescribed shape, heat-treating the tantalum or tantalum alloy under a condition where a native oxide layer of Ta_2O_5 formed on the surface of the processed tantalum or processed tantalum

alloy is sublimated, removing the Ta₂O₅ from the surface of the processed tantalum or processed tantalum alloy, heat-treating the tantalum or tantalum alloy by introducing a carbon source, and penetrating carbon from the surface of the tantalum or tantalum alloy.

- 5 14. The electrode of tantalum carbide according to claim 13, wherein
 the electrode of tantalum carbide is TaC formed by the penetration of
 carbon into all areas of the tantalum or tantalum alloy processed into a
 prescribed shape.
- 10 15. The electrode of tantalum carbide according to claim 13, wherein
 the electrode of tantalum carbide is a filament of the tantalum carbide
 or a heater of the tantalum carbide.